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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,754	08/29/2005	Nikola Kirilov Kasabov	PEBL-01001US1	6902

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EXAMINER	
WHALEY, PABLO S	

ART UNIT	PAPER NUMBER
1631	

MAIL DATE	DELIVERY MODE
10/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,754	KASABOV ET AL.	
	Examiner	Art Unit	
	PABLO WHALEY	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/30/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's after-final amendment filed 08/03/2009 is acknowledged and entered.

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Status of Claims

Claims 1-6 and 8-23 are currently pending and under consideration.

Claim 7 is cancelled.

Priority

Applicant's arguments [p.8] regarding priority have been fully considered. In response, this application has been granted the benefit of priority to Provisional Application No. 60/403,756, filed Aug. 15, 2002.

Information Disclosure Statement

The information disclosure statement 07/30/2009 has been considered in full.

The information disclosure statement filed 04/13/2009 fails to comply with 37 CFR 1.98(a)(2), because no copies of the Roland Eils and Jason Weston foreign patent documents were provided. Applicant must provide a legible copy of each of these cited foreign patent documents.

Withdrawn Rejections

The rejection of claims 1-6, 8-17, 19, 20, 21, and 22 under 35 U.S.C. 103(a) as being unpatentable over Sharpe in view of Barnhill, Kasabov, and Wu is withdrawn in view of applicant's arguments filed 08/03/2009 that Wu is no longer prior art due to the priority claim.

The rejection of claims 1-6 and 8-23 under 35 U.S.C. 103(a) as being unpatentable over Sharpe in view of Barnhill, Kasabov, Wu, and Tsumoto is withdrawn in view of applicant's arguments filed 08/03/2009 that Wu is no longer prior art due to the priority claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-6, 8-17, 19, 20, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharpe et al. (1993, Clinical Chemistry, Vol. 39. No. 11, p.2248-2253), in view of Kasabov et al.

(WO/2001/078003; Published: 18 October 2001), Kittler et al. (IEEE Transactions On Pattern Analysis And Machine Intelligence, 1998, Vol. 20, No. 3, p.226-239), and Krogh et al. (Advances in Neural Information Processing Systems, 1995, Vol. 7, p.231-238).

Sharpe teaches a computer platform suitably programmed to perform medical decision support for thyroid diagnosis [Abstract and p.2250, Software]. A plurality of different types of clinical data is provided as input to a neural network [Table 1]. A schematic diagram shows neural networks comprising input neurons, classification modules, and output modules [Fig. 1, Fig. 2, Fig. 3, p.2250, Col. 1], which shows a plurality of input modules for acquiring data and classifying data. Sharpe teaches output modules wherein each output is represented as a combination of weighted inputs [Fig. 1, Fig. 2, Fig. 3, p.2251], which is a teaching for calculating combined class outputs. Connection weights are assigned values between 0 and 1 [p.2251, Col. 1]. Error values are produced during the training process and used to minimize the output error [p.2249, Col. 2, ¶3], which shows minimizing error such that output has greater accuracy. The system classifies relationships between thyroid analysis values and diagnostic classifications using multilayer perceptrons and provides diagnostic groups [p.2249, Col. 2, p.2250, Col. 1, ¶2, p.2251, Col. 1], which is a teaching for a plurality of classifiers and medical outcomes. Sharpe suggests the use of additional software to confirm and validate input data and point out errors in advice to the user [p.2253, Col. 1, ¶2].

Sharpe does not teach the use of gene expression data as input, as in claims 1, 3, 5, and 8.

Sharpe does not teach calculating combined Class A and Class B outputs using the specific connection weight values for beta 1, beta 2, and alpha, as in claims 1, 3, and 23. However, it would have been obvious to one of ordinary skill in the art to substitute connection weights using any desired mathematical variable with predictable results, since this is an arbitrary design parameter.

Sharpe does not teach calculating a combined Class A/Class B output wherein the error of the combined Class A/Class B output is minimized and said combined Class A/Class B out has greater accuracy than either Class A or Class B output individually, as in claims 1, 3, and 23.

Sharpe does not teach an evolving connectionist neural network system, as in claims 11 and 21.

Sharpe does not teach a Bayesian process for minimizing error, as in claim 22.

Kasabov teaches a neural network module for adaptive decision support. In particular, gene expression data is used as input into the network for classification [p. 23, last ¶, p.24]. Kasabov teaches an adaptive component that represents connection weights as a summation of nodes and classes [p.8, lines 20-bottom, p.9, lines 1-15]. Kasabov also describes an evolving fuzzy neural network system (EFuNN), with associated weights and error parameter values [See at least Fig. 3, p. 16, last ¶, and Fig. 25], as in claim 11. Kasabov also compares global classification with local classification accuracy [Fig. 26]. This system provides improved recognition in a noise environment [p.24, ¶5].

Kittler teaches methods for improving classification performance using combined classifiers [p.226]. In particular, neural network classifiers are discussed and a combination scheme is presented which clearly shows combined classifiers with improved accuracy over the individual classifiers [Section 5.2.5, 5.3, Table 2, and Table 3]. Methods for calculating combined classes based on the sum rule (i.e. Class A), and the product rule (i.e. Class B) are described, wherein parameters x and w represent classes and classifiers [See at leas p.227, Col. 1 and p.228]. Kittler also teaches Bayesian methods for minimizing classification error [See at least p.227, Section 2]. The application of combining classifiers is important for integrating physically different types of measurements and features [p.227, Col. 1, ¶2].

Krogh shows that predictive methods based on combinations of classifiers are well known to provide improved results [Introduction]. In particular, Krogh provides mathematical support to show that the general error for combined classifiers is always smaller than the individual errors [See at least p. 3, ¶3, ¶4, Fig. 1, and p.6, last ¶].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the medical decision support system of Sharpe by incorporating gene expression data, as in claims 1, 3, 5, 8, and 23, and by using an evolving connectionist neural network system [Fig. 2], as in claims 11 and 21, since Kasabov shows gene expression data is commonly analyzed in neural networks with predictable results, and since Kasabov shows a decision support system based on an evolving connectionist neural network [Fig. 2, p.¶3]. The motivation would have been to provide improved classification in a high-noise environment, as suggested by Kasabov [p.24, ¶5].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the medical decision support system of Sharpe by calculating combined Class A and Class B outputs using the specific connection weight values, as in claims 1, 3, and 23, since Sharpe shows combined class outputs [See at least Fig. 1, Fig. 2, Fig. 3, p.2251] associated with connection weights between 0 and 1 with predictable results [p.2251, Col. 1]. The motivation would have been to select weight values that optimize model performance.

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the medical decision support system of Sharpe by calculating a combined Class A/Class B output wherein the error of the combined Class A/Class B output is minimized and said combined Class A/Class B out has greater accuracy than either Class A or Class B output individually, as in claims 1, 3, 22, and 23, since Kittler shows methods for determining combined classifiers and Bayesian methods for minimizing classification error [Section 5.2.5, 5.3, Table 2, and Table 3, p.227, Section 2], since Kasabov contemplates global classification and local classification accuracies [Fig. 26], and since it is well known that combinations of classifiers have greater accuracy and small error than individual classifiers, as taught by Krogh [Introduction, p. 3, ¶3, ¶4]. The motivation would have been to improve accuracy, as suggested by Kittler and Krogh, and to integrate physically different types of measurements and features into classification models, as suggested by Kittler [p.227, Col. 1, ¶2].

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sharpe et al. (1993, Clinical Chemistry, Vol. 39. No. 11, p.2248-2253), in view of Kasabov et al. (WO/2001/078003; Published: 18 October 2001), Kittler et al. (IEEE Transactions On Pattern Analysis And Machine Intelligence, 1998, Vol. 20, No. 3, p.226-239), and Krogh et al. (Advances in Neural Information Processing Systems, Vol. 7, p.231-238), as applied to claims 1-6, 8-17, 19, 20, 21, and 22, above, and further in view of Tsumoto (Information Sciences, 1998, Vol. 112, p.67-84).

Sharpe, Kasabov, Kittler, and Krogh make obvious a medical decision support system, as set forth above.

Sharpe, Kasabov, Kittler, and Krogh do not teach an exhaustive search strategy for minimizing error, as in claim 18.

Tsumoto teaches a computer-based method for making medical decisions regarding treatment and diagnosis [Abstract]. In particular, Tsumoto teaches an exhaustive search algorithm for eliminating candidates using combinations of attribute-value pairs [p.72, Section 4, p.73, Section 4.1, 4.2].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the medical decision support system made obvious by Sharpe, Kasabov, Kittler, and Krogh by alternatively using an exhaustive search strategy for minimizing error, as in claim 18, since Tsumoto teaches the use of exhaustive search algorithms for eliminating candidates to increase prediction accuracy [p.71, p.73, Section 4.1, 4.2]. The motivation would have been to improve decision making using additional software to confirm and validate input data and point out errors in advice to the user, as suggested by Sharpe [p.2253, Col. 1, ¶2].

Response to Arguments

Applicant's arguments, filed 08/03/2009, that Sharpe in view of Barnhill, Kasabov, Wu, and Tsumoto do not teach or make obvious calculating a combined class output so that the error of combined Class A/Class B output is minimized and said combined Class A/Class B out has greater accuracy than either Class A or Class B output individually have been fully considered. However, applicant's arguments are moot in view of the new grounds of rejections, as set forth above.

Applicant's arguments, filed 08/03/2009, that no "reasoned statement" of exactly how the combinations of references taught the above limitation have been fully considered but are not persuasive. The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, sufficient motivation to combine the above references was provided in the Office action mailed 06/02/2009 [See at least pages 6, 7, and 8].

Applicant's arguments, filed 08/03/2009, that the Declaration filed 02/06/2009 by Nikola Kasabov under 37 CFR 1.132, provides evidence that the instant invention results in improved accuracy and the non-obvious creation of a combined class A/class B output with greater accuracy that either class A or class B output individually have been fully considered but are moot in view of the new grounds of rejections, as set forth above.

Conclusion

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pablo Whaley whose telephone number is (571)272-4425. The examiner can normally be reached on 9:30am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached at 571-272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Pablo S. Whaley

Patent Examiner

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